COLD SPRINGS CREEK WATER DISTRICT
WATERMASTER: RICHARD NEAL
MAY 3, 2012

Attention all water users on Cold Springs Creek

Please be advised that after May 15,2012 all sources of water diversion from Cold Springs Creek must meet the minimum acceptable standards for open channel and closed conduit measuring devices as outlined in the enclosed information from the Idaho Department of Water Resources (IDWR).

As your elected Watermaster I intend to see that all users meet the minimum standards required by the Department of Water Resources. If you have an individual problem let me know so I can arrange a meeting with you, myself and a representative from IDWR.

Sincerely,

Richard Neal

Richard Neal, Watermaster Cold Springs Creek District # 61E

Cc:
Half Moon/Barber-Caven Ranchs
Arc Properties/Charter Mountain Ranchs
A N Bean
Sam & Lee Blackwell
Double Anchor Ranch
Ellis Trust, c/o Gary Ellis
Hammett Livestock, c/o Ann Wilson
Mule Shoe Ranch, c/e Chuck Shenk
Cold Springs Creek Water Users, Dist. 61E, Teresa McCallum, Pres.
Idaho Department of Water Resources c/o Rob Whtney

Kobs,

For your information

Rich

BEFORE THE DEPARTMENT OF WATER RESOURCES

OF THE

STATE OF IDAHO

IN THE MATTER OF REQUIRING MEASURING DEVICES AND CONTROLLING WORKS ON COLD SPRINGS CREEK, WATER DISTRICT NO. 61E	))))	**PRELIMINARY ORDER**

FINDINGS OF FACT

1. Diversions of water from Cold Springs Creek and its tributaries are controlled and regulated by the watermaster of Water District no. 61E, Cold Springs Creek.

2. The water rights authorizing diversion of water from Cold Springs Creek were decreed in the case of Stanfield v. McGinnis, (4th Judicial District, 1903). The rights authorizing diversion of water from Cold Springs Creek have been or will soon be decreed by the Snake River Basin Adjudication Court.

3. Not all of the waterusers owning water rights authorizing the diversion of water from Cold Springs Creek and its tributaries have installed, constructed, and maintained adequate measuring devices and controlling works for the administration by the watermaster and delivery of water to the waterusers.

5. The watermaster of Water District no. 61E has been required, in some cases, to determine water deliveries by estimating diversion rates based on imprecise methods of measurement or control.

CONCLUSIONS OF LAW

1. Idaho Code § 42-701 states, in part:

> (1) The appropriators or users of any public waters of the state of Idaho shall maintain to the satisfaction of the director of the department of water resources suitable headgates and controlling works at the point where the water is diverted. Each device shall be of such construction that it can be locked and kept closed by the watermaster or other officer in charge, and shall also be of such construction as to regulate the flow of water at the diversion point. Each such appropriator shall construct and maintain, when required by the director of the department of water resources, a rating flume or other measuring device at such point as is most practical in such canal, ditch, wellhead or pipeline for the purpose of assisting the watermaster or department in determining the amount of water that may be diverted into said canal, ditch, wellhead or pipeline from the stream, well or other

source of public water. Plans for such headgates, rating flumes or other measuring devices shall be approved by the department of water resources.

(3) Any appropriator or user of the public waters of the state of Idaho that neglects or refuses to construct or maintain such headgates, controlling works, or measuring devices. . ., upon receiving ten (10) days' notice from the director of the department of water resources within which to begin and diligently pursue to completion the construction or installation of the required device or devices or to begin and diligently pursue to completion a remedy to such defects as exist in accordance with said notice, then the director of the department of water resources may order the duly qualified and acting watermaster of the water district to shut off and refuse to deliver at the point of diversion, the water owned by such appropriator or user until the user does construct and maintain such headgates, controlling works or measuring devices or remedy the defects which exist or the director may take action pursuant to section 42-1701B, Idaho Code, to enforce the requirement to construct, install or maintain such devices.

(4) The appropriators or users of the public waters of the state of Idaho shall be given a reasonable time within which to complete construction of such headgates, controlling works or measuring devices, depending upon the size and extent thereof, when due diligence has been used in the prosecution of such work.

2. An order should be issued again requiring the water users of Cold Springs Creek and its tributaries to install, construct, and maintain adequate measuring devices and controlling works.

ORDER

IT IS HEREBY ORDERED that **on or before February 15, 2002, the water users diverting water from the main stem of Cold Springs Creek shall install, construct, and maintain measuring devices and lockable controlling works of a type acceptable to IDWR,** unless expressly exempted by IDWR after a showing by a water right holder that the structures are unnecessary.

IT IS FURTHER ORDERED that, **after February 15, 2001, the watermaster of Water District no. 61E shall shut off and refuse to deliver water** from Cold Springs Creek and its tributaries to any water user authorized to divert water from Cold Springs Creek and its tributaries who has not installed, constructed, and properly maintained adequate lockable controlling works and measuring devices.

Dated this 18th day of January, 2002.

GARY SPACKMAN
Western Regional Manager

COPY

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES (IDWR)

MINIMUM ACCEPTABLE STANDARDS FOR OPEN CHANNEL AND CLOSED CONDUIT MEASURING DEVICES

The source and means of diversion of water, whether surface or ground water, generally affects the selection of a measuring device. Surface water sources such as streams, springs and waste channels are normally diverted into open channels (ditches or canals), but closed conduits (pipes or culverts) are also used. Ground water is usually diverted into pipes (which may also discharge into open channels).

Measuring devices when required by IDWR are to be installed at or near the point of diversion from the public water source.

Open Channel

I. SURFACE WATER DIVERSIONS

The following discussion is applicable only to diversions from surface water sources. Measurement of a ground water diversion with an open channel measuring device must be pre-approved by the IDWR.

A. Standard Open Channel Measuring Devices

All open channel surface water diversions should be measured using one of the following standard open channel flow measuring devices commonly used in Idaho:

- contracted rectangular weir
- suppressed rectangular weir
- Cipolletti weir
- 90 degree V-notch weir
- Parshall flume
- trapezoidal flume
- submerged rectangular orifice
- constant head orifice
- ramped broad crested weir (or ramped flume)
- acoustic Doppler flow meter (ADFM)

Construction and installation of these devices should follow published guidelines. References are available upon request.

B. Non-standard open channel devices: Rated Structures or Rated Sections

IDWR may authorize the use of non-standard devices and rated sections provided the device or section is rated or calibrated against a set of flow measurements using an acceptable open channel current meter or a standard portable measuring device. Further restrictions and requirements are available from IDWR upon request.

II. CLOSED CONDUIT MEASURING DEVICES

New installations for closed conduit or pipe line diversions require installation of a magnetic type flow meter. There are many flow meters on the market, with costs ranging from several hundred dollars to several thousand dollars. In general, the higher priced meters are more accurate and require less maintenance. Most meters on the market have an acceptable accuracy rating for IDWR's guidelines. For existing mechanical type flow meters IDWR will allow for a variance if the existing flow meter is shown to meet the minimum requirements in section B of the Flow meter specifications in this document.

A. Flow Meter Specifications

Currently there are two types of magnetic flow meters available. Full profile magnetic type flow meters are flanged into the piping system and measures across the velocity profile. Insertion type magnetic meters are installed through a small diameter hole in the piping system and attempt to measure the average velocity (determined by pipe diameter and insertion depth of sensor) in the flow profile. Small diameter (< 12" in diameter) pipes should be fitted with a full profile magnetic type meter due to higher accuracy and less straight pipe requirements for installation. Larger pipe diameters may use insertion type meters but must meet the standards for accuracy listed below. Insertion type magnetic meters will require larger straight distances of pipe to minimize turbulence above and below the measurement point.

Listed below are the flow meter requirements and specifications for full-flowing closed conduits or pipes. These specifications apply to all irrigation and non-irrigation water uses except domestic systems as defined in Section 42-111, Idaho Code. Water users may apply to IDWR for a variance to these specifications in accordance with Criteria for Request for Variance of measuring Device Requirements of Section II C. of this document

Meters shall be magnetic flow meters meeting the following minimum specifications:

1) Flow range of 0.1 to 33 feet per second (fps).
2) Listed manufacturer accuracy of ± 2% of flow rate from 0.1 to 33 feet per second (fps), with a repeatability of ±0.5% of reading.
3) The register or display unit shall:
   a) Have a waterproof and tamperproof seal.
   b) Have an LCD backlit display showing instantaneous flow rate and totalized volume.
   c) Have a minimum of six (6) digits for flow rate.
   d) Have a minimum of eight (8) digits for totalized volume display or a sufficient number of digits so that "rolling over" will not occur within two years operation, based on the maximum rate of flow and annual volume elements of the authorizing water rights. For totalizing data, IDWR recommends using the attached guidelines (see Table 1) for proper meter (totalizing units) selection for the intended use.
   e) Have password or similar protection of all settings and data to protect against unauthorized change or accidental loss of data.
   f) Contain a back up battery (according to manufacturers specifications) to prevent loss of data in the case of primary power failure.
   g) The display unit must contain user programmable features that allow the selection of flow units. Available flow units must include, but are not limited to, gallons per minute (gpm) or cubic feet per second (cfs). The meter flow rate display must also

allow decimal display formatting of up to three (3) places when using cubic feet per second units.

h) The volume totalizer display must contain user programmable features that allow the selection of volumetric units that must include but are not limited to, total gallons or acre feet. The meter must also allow decimal display formatting of up to four (4) places, and the application of unit multipliers ranging from .0001 to 10,000. See Table 1 below for examples of appropriate meter multipliers based on expected annual volume use.

4) Signal Output when Data Logger is Required
Data loggers are required only for magnetic flow meters installed as per conditions of approval for water right transfers in the Eastern Snake Plain Aquifer, or as may be required by specific water right conditions of approval in other locations.
Scaled pulse frequency output (or pulse counting) is required for continuous recording of totalized volume data on data loggers. Output signals must be compatible with data logger inputs. Analog output signal for flow rate (usually 4-20mA) is also optional (most magnetic flow meters provide both analog and pulse frequency as standard output signals).

B. Meter Installation and Diversion System Requirements

Meters required under Section II A. above shall meet the following installation requirements:

1) The minimum and maximum system operating flows and pressures must be fully within the range of measurable flows and pressures identified in the meter specifications.
2) Pipes must be full flowing.
3) The installed flow rate accuracy of the installed magnetic flow meter must be ± ***5.0%*** as compared to a second, standard flow meter. The installed flow rate accuracy for mechanical flow meters is ± ***10%*** of rate of as compared to a second, standard flow meter.
4) Meters must be installed according to manufacturer's specifications. Most manufacturers' recommend that meters be installed a certain distance from turbulence-causing bends and fittings such as discharge heads, single elbows, and valves. Industry standards for such distances are listed below, but larger distances may be required if the turbulence is severe.
    a. Full profile magnetic flow meters require three (3) pipe diameters upstream of the meter and two (2) downstream.
    b. Insertion magnetic flow meters require (10) pipe diameters upstream of the meter and five (5) pipe diameters downstream.
5) Meter Certification: IDWR will certify the installed flow meter for accuracy using a second, standard flow meter. A location for measuring flow with a second standard meter must be provided as close to the installed meter as possible. A section of straight pipe with a minimum of 24 inches in length (for pipe diameters 16 inches and smaller) of unobstructed exposed pipe shall be provided for calibration purposes. The calibration section must be free of elbows, valves and other fittings, and must contain the same flows that are passing through the meter. The 24-inch certification section may be incorporated into the manufacturer's pipe requirements above or below the flow meter.

Table 1: Use for proper meter selection based on water right volume.

Volume Acre Feet (AF)	Multiplier X gallons (gal)	Multiplier X Acre Feet (AF)
0-150	1, 10, 100	.0001, .001
150-1000	10, 100, 1000	.001, .01
>1000	100, 1000	.001, .01

C. Requests for Variance of Closed Conduit Measuring Device Requirements

Owners of closed conduit diversions may request a variance of the standard magnetic flow meter requirements of section II A. above for the following reasons:

a) An operable flow meter is already installed
b) Installation and maintenance of the standard meter would be burdensome

If a meter is already installed, that meter may be used if the meter is field-tested by IDWR staff and/or the water district watermaster using a portable certified standard flow meter and upon a determination that the meter is installed properly and accurate to within ±10% of actual rate of flow and volume. ***IDWR or the water district watermaster should apply a calibration factor to flow meters whenever the calibration measurement is greater than ±1.0%.***

If a user demonstrates that installation and maintenance of the standard meter would be burdensome, then IDWR may consider alternate measurement options including:

a) Development of Power Consumption Coefficient to estimate water use volumes (generally acceptable for simple ground water irrigation diversion systems only)
b) Installation of one or more time clocks or hour meters (requires periodic flow measurements and recording of hours of water use from meter or clock).
c) Installation of an alternative flow meter as shown in Table 2 below. Alternative flow meters may vary with respect to straight pipe length requirements. Mechanical flow meters require ten (10) pipe diameters upstream of the meter and five (5) pipe diameters downstream.

Users considering making a variance request may contact IDWR or the local water master for further information.

1. Use of Power Records as an Alternative Measurement Method

An alternative to installing flow meters is the use of power records and other information to estimate the annual diversion from a pump. Estimating total water diversion from power records requires the derivation of a relationship between power demand and flow under normal operating conditions. This relationship, called a power consumption coefficient (PCC), is a ratio of the number of kilowatt hours needed to pump an acre-foot of water. This number is unique to each well or pumping plant due to the physical attributes of the system and can be applied to the year end power records to determine the total acre-feet pumped.

Total power consumption at individual irrigation pumping plants is supplied to the Department by electric utilities. To determine the rate of flow, a portable measuring device, such as a non-invasive ultrasonic flow meter can be used. Simultaneous with the flow measurement, power is measured using the utility's kilowatt-hour meter. A qualified individual with the necessary equipment will be required to perform these measurements.

Some complex systems cannot use this method due to the potential for large errors. See the discussion in the following section to see if this method can be used.

Because systems wear and water levels change, it is necessary to occasionally verify the flow to power ratio. Therefore, the power consumption coefficient must be re-calibrated at least once every three years.

2. Can Power Records be used to Estimate My Diversion?

Only irrigation water users may use power records to estimate their diversion because the utilities will only provide consumption information for irrigation uses. If you are not an irrigation user, but want to use power records, you must propose a method of reporting your power consumption data.

Owners of **surface water diversions** must have a flow measuring device in most cases. The alternate method of estimating water withdrawals with power records cannot be used unless you pump from a public water source and can show the Department that it will yield reliable results (case by case determination).

Owners of **ground water diversions** can either install a totalizing flow meter or ask the Department to use power records to estimate withdrawals. If the pump discharges to an open channel, an open channel measuring device can be employed to measure the water diverted if the device and a method of tracking hours of operation are pre-approved by the Department. Flow meters which register only instantaneous flow rate are not acceptable unless the water user can demonstrate a reliable method of tracking the number of hours the pump operates through the season (the flow measuring device must then be read and flow rate recorded at least once per week).

The total water diverted can be accurately estimated from the PCC method if the system configuration or operation is not complex. Unfortunately, the PCC or power records will not always yield acceptable results, and it will be necessary to install a flow meter. **Flow meters must be installed if any of the following conditions exist:**

- The well flows (artesian) so that water can be diverted when the pump is off.

- The energy consumption meter that records power used by the pump also records power used by other devices not integral to the irrigation system. For example, if the meter also records power used by a home, shop, cellar, re-lift pumps from surface water sources etc., a flow meter must be installed because power used by the pump cannot be isolated from the other devices. However, if the meter also records power used by center pivots, booster pumps, or other devices which operate as part of the well pumping system, the alternate method may be acceptable.

- The electrical meter records the power used by more than one well pump. If a deep well pump which discharges to an open pond or ditch and a re-lift pump are both connected to the same electrical meter, the discharge from the well pump can be measured, and a time clock can be installed to record the total number of hours of pump operation which can be multiplied by the flow rate to determine the total volume of water diverted.

- Variable frequency drives (VFD) operate the pumping plant. This includes both drives for the well motor and the booster system. Variable frequency drives generally indicate that multiple operating conditions exist in the system where large kilowatt and pressure changes are present.

- The energy supplied to the pump cannot be accurately and reliably measured. For example, most diesel and propane driven pumps do not have provisions to measure the fuel used by the engine.

- The flow rate from the pump varies significantly due to changes in demand or operation. For example, pumps that discharge into a pressurized system some times and then open discharge at other times, or pumps that supply multiple pivots and/or other discharge points, would likely have flow rates that change considerably. These changes generally alter the flow to power ratio, causing inaccurate estimates of diversions. The alternate method of estimating water withdrawals with power records may only be used if the water user can propose an acceptable method of tracking these changes in operation.

- Changing water levels that cause the flow to vary more than 25% (or pressures to vary more than 15%) over the irrigation season.

Table 2: Types of Alternative Measuring Devices for Closed Conduits

Types	Pipe Sizes	Maintenance Required	Relative Purchase Price
Differential Head • Orifice • Venturi • Annubar	small to large	Low to high. Sand wears on sharp edges, and particles can plug small orifices and tubes.	low to medium
Force Velocity • Turbine • Propeller • Impeller	small to large	Typically moderate to high. Often problematic when exposed to sand or moss. Some cannot measure low velocities	low to medium
Ultrasonic or Acoustic Doppler	small to large	Low. Typically non-invasive with no moving parts to wear	high
Vortex	small to medium (about 12 to 14 inch maximum pipe diameter	Low. Few or no moving parts to wear.	High